The Veliger 51(1):15–25 (March 31, 2010)

THE VELIGER

A New Species of *Hypselodoris* and a Redescription of *Hypselodoris picta lajensis* (Nudibranchia: Chromodorididae) from Brazil

SIMONE DACOSTA

Zoologische Staatssammlung München, Münchhausenstr. 21, 81247 München, Germany
(e-mail: simonedacosta@gmx.de)

VINICIUS PADULA

Departamento de Invertebrados, Museu Nacional / Universidade Federal do Rio de Janeiro, Quinta da Boa Vista s/n, São Cristóvão, 20940-040, Rio de Janeiro, RJ, Brasil
(e-mail: viniciuspadula@yahoo.com)

AND

MICHAEL SCHRÖDL

Zoologische Staatssammlung München, Münchhausenstr. 21, 81247 München, Germany
(e-mail: schroedl@zi.biologie.uni-muenchen.de)

Abstract. The external and internal morphology of *Hypselodoris juliae* sp. nov. is described in detail. This beautiful new species differs from congeners by its pale notum with many orange or yellow lines and iridescent blue patches, a relatively short prostate, and the absence of denticles on the lateral radular teeth. Its known geographic distribution includes the southeastern Brazilian coast, and possibly the Caribbean Sea. Tropical western Atlantic species of *Hypselodoris* are discussed comparatively. A redescription of *Hypselodoris picta lajensis*, which is known only from the southeastern and southern coast of Brazil, is presented. For the first time, wide intraspecific variation in coloration, radula, and features of the reproductive system of this subspecies was observed. Because of this variation, we prefer to maintain the subspecies rank of *H. picta lajensis* until a comprehensive revision of all *H. picta* material, including detailed anatomical comparisons and also a molecular approach, can provide a better understanding of this group.

INTRODUCTION

Most of the knowledge of the Brazilian nudibranch fauna results from the studies of Ernst and Eveline Marcus between 1950 and 1980. From samples in the intertidal zone and from material obtained from research vessels, those authors described most of the Brazilian species (Ev. Marcus, 1977; Rios, 1994). Scuba diving now enables researchers to collect specimens in the still poorly studied Brazilian subtidal zone. Consequently, a number of species have recently been discovered and described from offshore islands and the continental coast (Troncoso et al., 1998; García et al., 2002; García & Troncoso, 2003, 2004; Pola et al., 2005; Domínguez et al., 2006a, b). Our own investigations on aeolid nudibranchs resulted in four new records from the Brazilian coast (Padula & Absalão, 2005; Padula & Santos, 2006) and in the description of a new Brazilian subspecies of *Flabellina engeli* Marcus & Marcus, 1968 (DaCosta et al. 2007). To date, approximately 100 nudibranch species have been reported from Brazil. Three of them belong to the genus *Hypselodoris*: *Hypselodoris marci* Marcus, 1971; *H. picta lajensis* Troncoso et al., 1998, and *H. sycilla* (Bergh, 1890). This number is very small, since the genus currently comprises at least 69 species, most of which occur in tropical and subtropical seas (Wilson & Willan, 2007; Ortea & Bacallado, 2007).

In the present study, we describe in detail the external and internal morphology of a new species of *Hypselodoris* collected at Cabo Frio, on the southeastern coast of Brazil. The new species is compared with congeners from Brazil and the Caribbean Sea. *Hypselodoris picta lajensis*, for which major anatomical data was basically limited to the type specimen, is comprehensively redescribed.

MATERIAL AND METHODS

The specimens were collected manually in the intertidal zone and through scuba diving on different sites in the

Cabo Frio region, on the southeastern Brazilian coast, between December 2002 and December 2006. In the laboratory, the specimens were photographed and measured alive, relaxed with a 10% $MgCl_2$ solution, and preserved in 70% ethanol. With the aid of a binocular microscope, two specimens of *Hypselodoris juliae* sp. nov. and six specimens of *H. picta lajensis* were dissected, each through a dorsal incision. Internal features were examined and drawn using the camera lucida of the microscope. The buccal mass was removed and dissolved in a 10% sodium hydroxide solution to isolate the armed labial cuticle and the radula from the surrounding tissue. Then the hard parts were rinsed in water, dried, and mounted for examination with a scanning electron microscope (SEM).

Abbreviations: MNRJ, Museu Nacional/Universidade Federal do Rio de Janeiro; ZSM, Zoologische Staatssammlung München.

SYSTEMATICS

Family Chromodorididae Bergh, 1891

Genus *Hypselodoris* Stimpson, 1855

Type species: By monotypy, *Goniodoris? obscura* (Stimpson, 1855). Port Jackson, Australia.

Hypselodoris juliae sp. nov.

(Figures 1–4)

? *Hypselodoris* sp. 4 Rudman, (2001–2003).
? *Hypselodoris* sp. 1 Valdés et al., 2006: 165.

Material examined:

Holotype: MNRJ 10940, 57 mm alive, dissected, Praia das Conchas, Cabo Frio, state of Rio de Janeiro, Brazil, 22°52′15″S, 41°58′52″W, intertidal, 14 November 2004, *leg.* V. Padula.

Paratype: ZSM 20040149, 1 specimen, dissected, Ilha dos Papagaios, Cabo Frio, state of Rio de Janeiro, Brazil, 22°53′49″S, 41°59′2″W, 8 m depth, 28 December 2002, *leg.* S. DaCosta.

Additional material: A color photo of a living specimen from Guarapari, state of Espírito Santo, Brazil.

Etymology: This species is dedicated to Julia Carvalho Schrödl, the daughter of Michael Schrödl.

Geographic distribution: Southeastern coast of Brazil: state of Rio de Janeiro (Cabo Frio region) and the state of Espírito Santo (Guarapari). *Note*: specimens from the Caribbean region illustrated by Rudman (2001–2003) as *Hypselodoris* sp. 4 and by Valdés et al. (2006) as *Hypselodoris* sp. 1 appear to be conspecific. Anatomical studies on specimens from these localities will be necessary to confirm this distribution.

External morphology: Living holotype 57 mm long. Body elongate, slightly higher than wide. Background color pale blue to pale green with small iridescent blue patches, and covered by numerous parallel longitudinal yellow or orange lines (Figure 1A). Lateral body wall and posterior dorsal region of foot with similar pattern, becoming pale blue with orange spots near the foot sole (Figure 1C). Genital opening surrounded by an orange ring. Foot sole pale blue (Figure 1B). Holotype (MNRJ 10940) with 21, and paratype (ZSM 20040149) with 13, continuous dorsal lines plus some incomplete lines running from anterior to posterior notum margin, interrupted by rhinophores and gill circle. Orange line surrounding the base of each rhinophore. Region above the eyes without pigmentation. Undulating mantle border; margin orange on dorsal and ventral side. Submarginal grayish band with pale blue circular spots, except for dark middle notum area with two short transverse orange lines (Figure 1A). Anterior and posterior notal spots encircled by orange lines. Row of pale blue spots on the submarginal band corresponding to the position of mantle dermal formations (MDFs). No MDFs in dark middle area. Bilabiated anterior foot margin, upper lip orange, not notched. Oral tentacles short, digitiform, very near the mouth. Rhinophores retractile into the moderately elevated sheaths. Rhinophores perfoliate with 21 lamellae (holotype: MNRJ 10940) and 19 lamellae (paratype: ZSM 20040149); dark green with a dark-blue distal portion in the holotype and uniformly dark blue in the paratype; rhinophores with clear tip and a posterior small white mark near the base. Low gill sheath; longitudinal orange lines ending at margin, i.e., without encircling gills. Ten unipinnate, bipinnate, or tripinnate yellowish gills (Figures 1A and 1C). Gill rachis black in the holotype and dark blue in the paratype, with orange margins. Rows of small whitish spheres, probably glands, shining through gill tissue.

Digestive system: Oral tube wide and strong, increasing in volume after a slight constriction at its midlength (Figure 3A). Jaw rodlets stout to elongate, unicuspid. Bulbous pharynx with posteroventrally projecting radula sac. Radula measuring 4 mm in length in holotype, with formula 85 × 165.0.165. Radula of paratype measuring 2.6 mm in length, with formula 58 × 125.0.125. Rachis narrow, devoid of teeth. Lateral teeth hook-shaped, bicuspid; slender cusps, pointed, almost equally long or upper cusp slightly longer than lower cusp. Some initial lateral teeth of holotype having only vestigial upper cusps. Outer lateral teeth elongate with very short, blunt cusps (Figure 2).

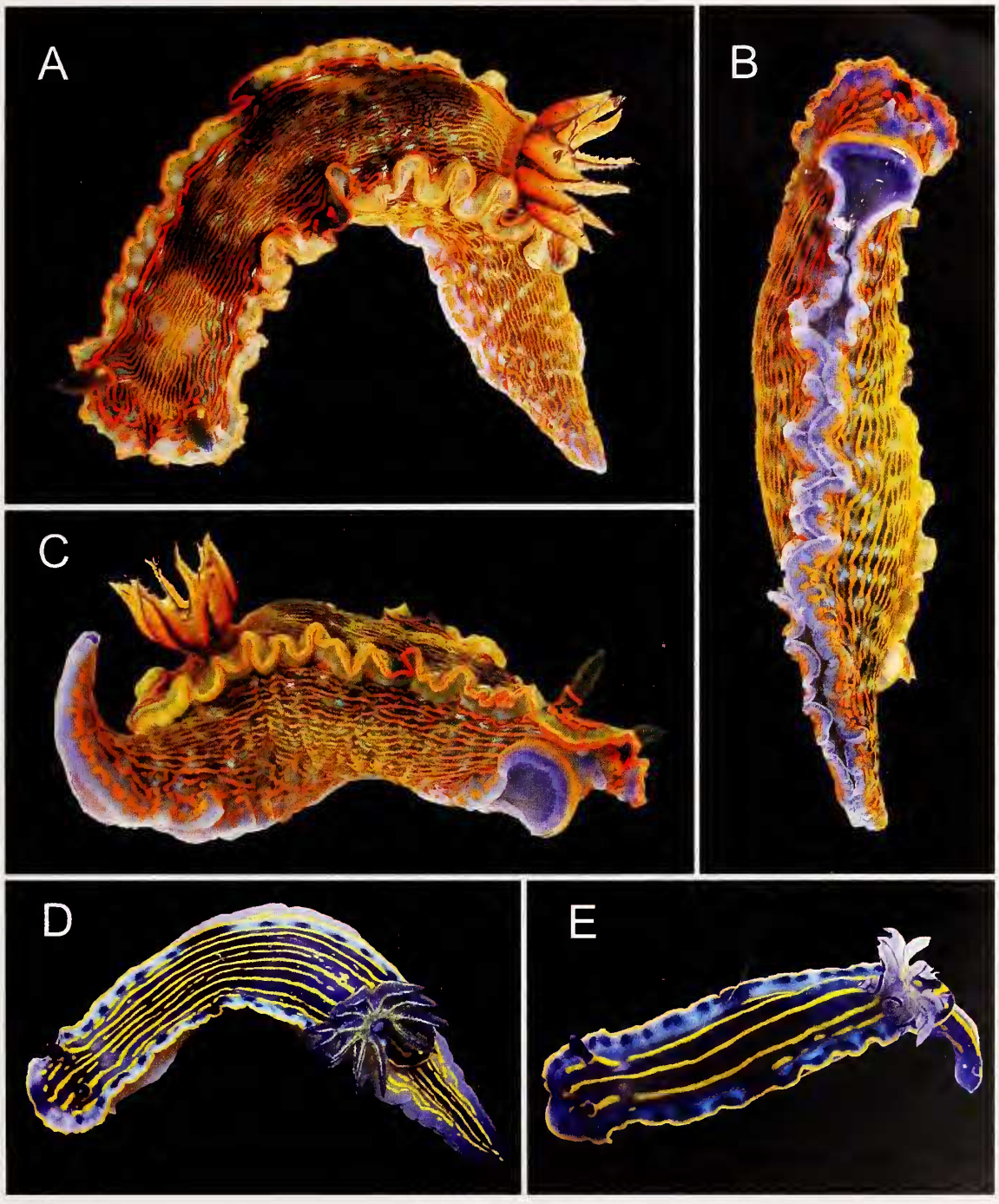

Figure 1. *Hypselodoris juliae* sp. nov., living holotype (MNRJ 10940): A, dorsal view; B, ventral view; C, lateral view. *Hypselodoris picta lajensis* (MNRJ 11973), intraspecific variation: D, adult specimen with many dorsal lines, yellow mantle margin; E, adult specimen with three dorsal lines and yellow mantle margin.

Tubular salivary glands, entering pharynx laterally to thin-walled, tubular esophagus. Stomach and spherical calcum completely embedded in the holohepatic digestive gland. Intestine leaving stomach posteriorly, then bending upward and forward, leaving digestive gland as a slender tube. Middle portion of intestine more voluminous, forming a loop directed backward to right side of body; narrow distal intestinal portion, running toward the anal papilla in the center of the gill circle (Figure 3A).

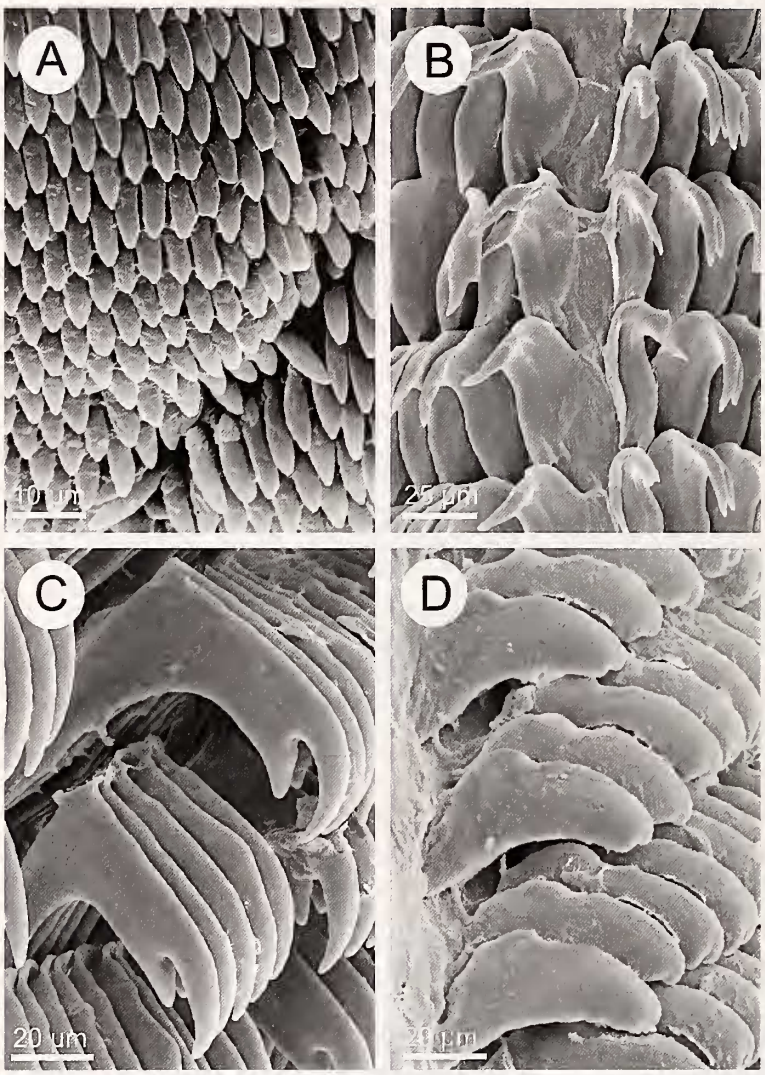

Figure 2. *Hypselodoris juliae* sp. nov., SEM micrographs of the holotype (MNRJ 10940): A, jaw rodlets; B, innermost radular teeth; C, midlateral teeth of the radula; D, outermost radular teeth.

Circulatory system: Voluminous pericardium lying posteromedially in the body cavity above gonad and digestive gland. Two-chambered heart, longitudinally oriented; trapezoidal auricle, posterior to muscular, spherical ventricle. Aorta dividing into posterior aorta running to left side of viscera and anterior aorta leading to the head (Figure 3B). Whitish blood gland, consisting of two flat lobes; posterior lobe partly covering salivary glands and distal reproductive system, anterior lobe very elongate and reaching to anterior portion of body cavity. Syrinx leaving the pericardium ventrally to the atrium (Figure 3B).

Nervous system: Comprising paired cerebropleural, pedal, buccal, gastroesophageal, and rhinophoral ganglia, which surround anterior esophagus (Figure 4A and 4B). Cerebral and pleural ganglia completely fused, i.e., no external separation detectable; single, short, thick commissure. Cerebropleural ganglia much larger than pedal ganglia. Cerebropleural–pedal connectives very short. Statocyst with several otoconia laterally attached between cerebropleural and pedal ganglia. Small rhinophoral ganglia anteriorly attached to cerebropleural ganglia. Single rhinophoral nerve leaving each rhinophoral ganglion and leading to the accessory ganglion within rhinophore stalk; some thin nerves innervating rhinophoral lamellae. Pigmented eyes, short optic nerve. Buccal ganglia situated between the radula sac and the esophagus. Very short buccal commissure. Small gastroesophageal ganglia (Figure 4B).

Reproductive system: Gonad covering digestive gland dorsally. Proximal gonoduct a long thin tube. Distal

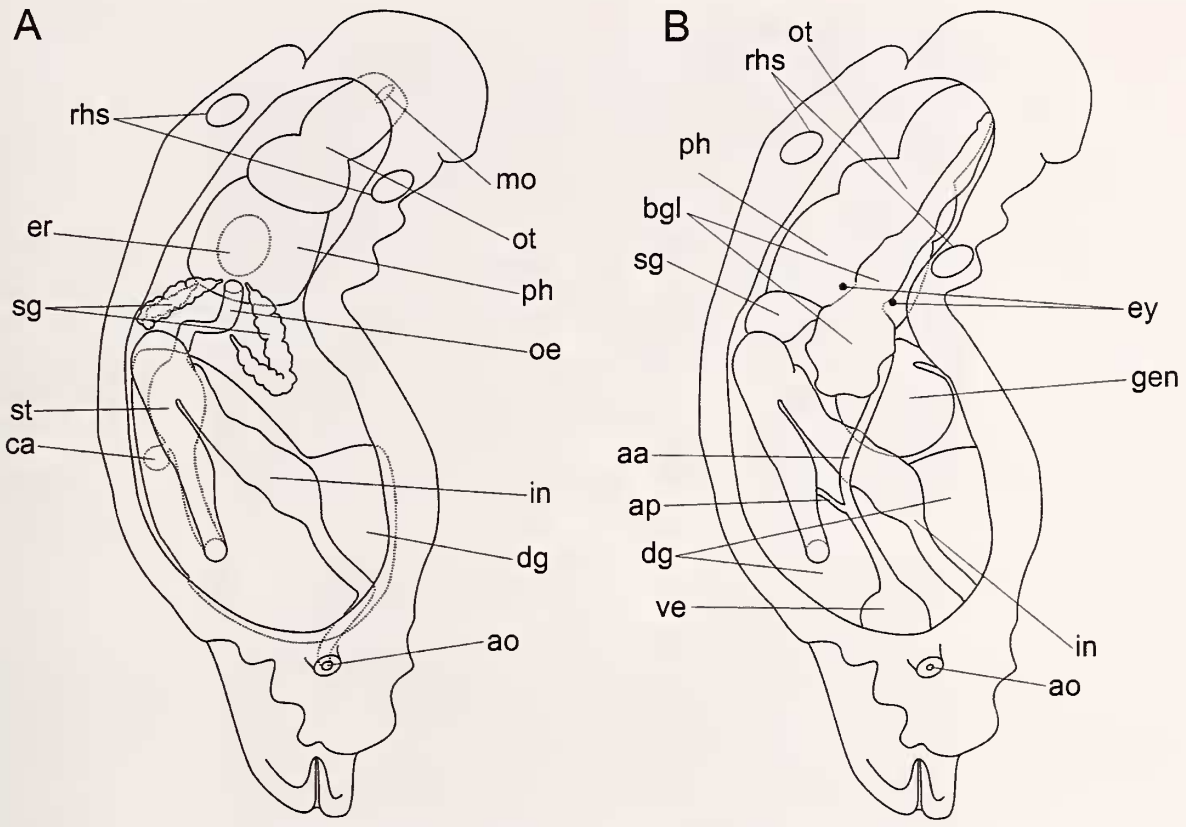

Figure 3. *Hypselodoris juliae* sp. nov., schematic anatomical drawings: A, digestive system; B, organization of major organ systems. Abbreviations: **aa,** anterior aorta; **ao,** anus opening; **ap,** posterior aorta; **bgl,** blood gland; **ca,** digestive caecum; **dg,** digestive gland; **ey,** eyes; **gen,** reproductive organs; **in,** intestine; **mo,** mouth; **oe,** esophagus; **ot,** oral tube; **ph,** pharynx; **r,** radula; **rhs,** rhinophoral sheath; **sg,** salivary gland; **st,** stomach; **ve,** ventricle.

genital system triaulic. Hermaphroditic ampulla short and swollen. Short distal gonoduct. Thin oviduct, entering female gland mass after a short distance. Short prostate. Prostatic loops attached to bursa copulatrix. Distal vas deferens a winding tube, relatively short. Ejaculatory duct simple, without armature, slightly everted into the elongate penial sheath (Figure 4C). Male and female atria distally combined into common vestibule. Vagina a relatively wide tube. Allosperm receptacles vaginally arranged. Bursa large, spherical, thin-walled. Receptaculum seminis club-shaped, half the diameter of bursa, short-stalked. Thin uterine duct splitting off vagina slightly distal to, and opposite of, receptacle stalk; uterine duct entering female gland mass close to the oviduct. Female gland mass well developed, consisting of several barely distinguishable glandular portions. Nidamental duct showing conspicuous unilateral swelling; nidamental opening posterior to joint vestibule. Flat glandular lobe covering half of female gland mass; deferent duct hidden between nidamental opening and vestibule (Figure 4C).

Hypselodoris picta lajensis Troncoso, García, & Urgorri, 1998

(Figures 5–7)

Hypselodoris picta lajensis Troncoso, García, & Urgorri, 1998: 135

Hypselodoris lajensis Troncoso, García, & Urgorri, 1998: Domínguez, García & Troncoso (2006: 633)

Material examined: ZSM 20040122, one specimen, 20 mm fixed, dissected, Ilha do Papagaio, Cabo Frio, state of Rio de Janeiro, Brazil, 22°53′49″S, 41°59′2″W, 28 December 2002, 10 m depth, *leg.* S. Da Costa. ZSM 20040123, one specimen, 25 mm fixed, dissected, Ilha do Papagaio, Cabo Frio, state of Rio de Janeiro, Brazil, 22°53′49″S, 41°59′2″W, 28 December 2002, 6 m depth, *leg.* S. DaCosta. MNRJ 11972, two specimens, 35–50 mm alive, dissected, Ilha Comprida, Cabo Frio, state of Rio de Janeiro, Brazil, 22°52′15″S, 41°56′53″W,

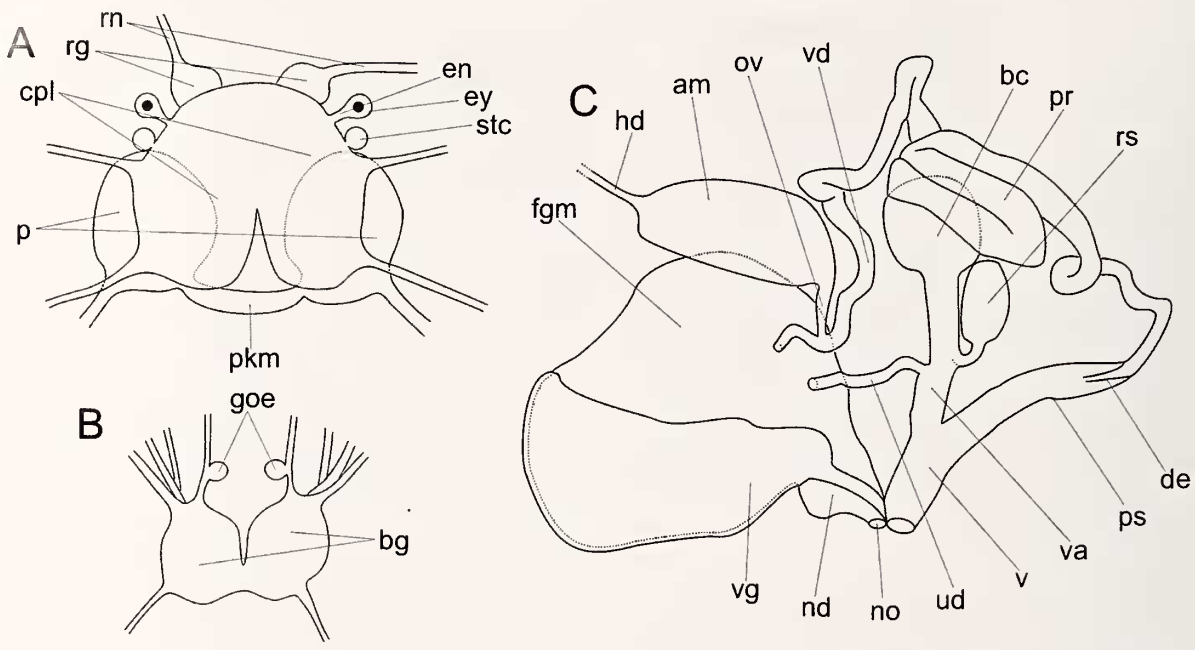

Figure 4. *Hypselodoris juliae* sp. nov. A, B, central nervous system; C, reproductive system. Abbreviations: **am,** ampulla; **bc,** bursa copulatrix; **bg,** buccal ganglia; **cpl,** cerebropleural ganglia; **de,** ejaculatory duct; **en,** optic nerve; **ey,** eye; **fgm,** female gland mass; **goe,** gastroesophagial ganglia; **hd,** hermaphrodite duct; **nd,** nidamental duct; **no,** nidamental duct opening; **ov,** oviduct; **p,** pedal ganglia; **pkm,** pedal commissure; **pr,** prostate; **ps,** penial duct; **rg,** rhinophoral ganglia; **rn,** rhinophoral nerve; **rs,** seminal receptacle; **stc,** statocyst; **udi,** uterine duct; **v,** vestibulum; **va,** vagina; **vg,** vestibular gland.

17 December 2006, 6 m depth, *leg.* V. Padula. MNRJ 11973, three specimens, 35–40 mm alive, two dissected, Ilha do Papagaio, Cabo Frio, state of Rio de Janeiro, Brazil, 22°53′49″S, 41°59′2″W, 17 December 2006, 8 m depth, *leg.* V. Padula.

Distribution: Southeastern and southern coast of Brazil: states of Rio de Janeiro, São Paulo, and Santa Catarina (Domínguez et al., 2006; present study).

External morphology: Living specimens ranging from 15 to 50 mm in length. Elongated body, slightly higher than wide. Adult background color dark blue to dark violet; body covered by longitudinal yellow lines (Figures 1D and 1E). Very young specimens with complete white mantle margin and having a complete yellow line on the central dorsum merged by two incomplete ones. Adults with three to nine dorsal longitudinal yellow lines. Lateral body walls and posterior dorsal region of the foot pale or dark blue with similar pattern of longitudinal yellow lines, sometimes not continuous. Genital opening surrounded by a yellow ring in most (not all) specimens examined. Foot sole pale blue. Notum above eyes without pigmentation. Free notum border not undulated. Notum margin either completely yellow or white with small anterior and lateral yellow marks. Submarginal pale blue band with alternation of whitish and dark blue areas. Large MDFs (mantle dermal formations) distributed along anterior and posterior notal border. Anterior foot margin bilabiate, upper lip with a yellow line, not notched. Oral tentacles short and digitiform, dark blue distally. Rhinophores retractile into moderately elevated sheaths. Dark blue rhinophores perfoliate, with 20 lamellae in a 30-mm specimen; low gill sheath; longitudinal yellow lines ending at the margin, i.e., without encircling gills. Gill blue or violet, unipinnate or bipinnate. Gill rachis dark blue, with or without yellowish borders (Figures 1D and 1E).

Digestive system: Strong, muscular oral tube. Jaw rodlets stout to elongated, unicuspid, with curved tips (Figure 5A). Pharynx bulbous with posteroventrally projecting radula sac. Radula formulae 64 × 134.0.134 (ZSM 20040122, 20-mm fixed specimen) and 58 × 122.0.122 (MNRJ 11972, 35-mm living specimen). Narrow rachis, devoided of teeth. Lateral teeth hook-shaped, bicuspid; cusps slender, pointed, upper cusp generally longer than lower cusp, but of equal size in some teeth. Initial lateral teeth bicuspid; a triangular denticle can occur at base of the upper cusp (Figure 5B). Some first lateral teeth having a single cusp. Midlateral teeth with 1–7 denticles under lower cusp; denticles may be blunt or pointed (Figure 5C). Outermost lateral teeth elongated with a blunt apical cusp; secondary blunt cusps present or absent (Fig-

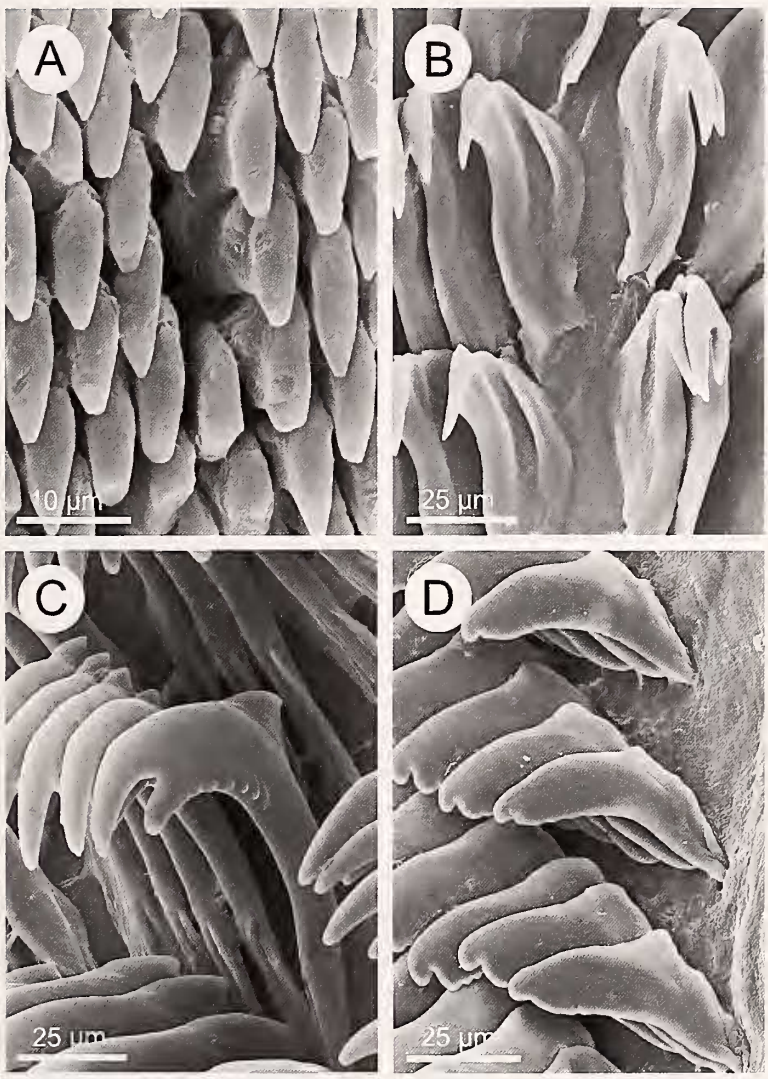

Figure 5. *Hypselodoris picta lajensis* (MNRJ 11972), SEM micrographs of hard parts. A, jaw rodlets; B, innermost radular teeth; C, midlateral teeth of the radula; D, outermost radular teeth.

ure 5D). Salivary glands tubular, entering pharynx laterally to the thin-walled, tubular esophagus. Stomach and spherical caecum completely embedded in the holohepatic digestive gland. Intestine arising from terminal stomach towards the anterior region of the body, then curving to the right side and leading backwards to center of gill circle (Figure 6A).

Circulatory system: Voluminous pericardium lying posteromedially in body cavity, above gonad and digestive gland. Two-chambered heart, longitudinally oriented; trapezoidal auricle, posterior to a muscular and spherical ventricle. Aorta divided into posterior aorta running into left side of viscera, and anterior aorta leading to head. Whitish blood gland, consisting of two flat lobes; posterior lobe partly covering salivary glands and distal reproductive system, anterior lobe very elongated and reaching the anterior region of body cavity. Syrinx leaving right pericardium ventrally to the atrium (Figure 6B).

Nervous system: Comprising paired cerebropleural, pedal, buccal, gastroesophageal, and rhinophoral ganglia. Cerebral and pleural ganglia merged, larger than the other ganglia. Thickened rhinophoral nerves at base of rhinophoral ganglia. Rhinophoral ganglia located anterior to cerebropleural ganglia. Optic nerve short, situated laterally to cerebropleural ganglia. Statocysts placed laterally to cerebropleural ganglia, near pedal ganglia and beside eyes. Pedal ganglia ventral to, and slightly smaller than, the cerebropleural ganglia. Small buccal ganglia with short buccal commissure. Two gastroesophageal ganglia situated near buccal ganglia.

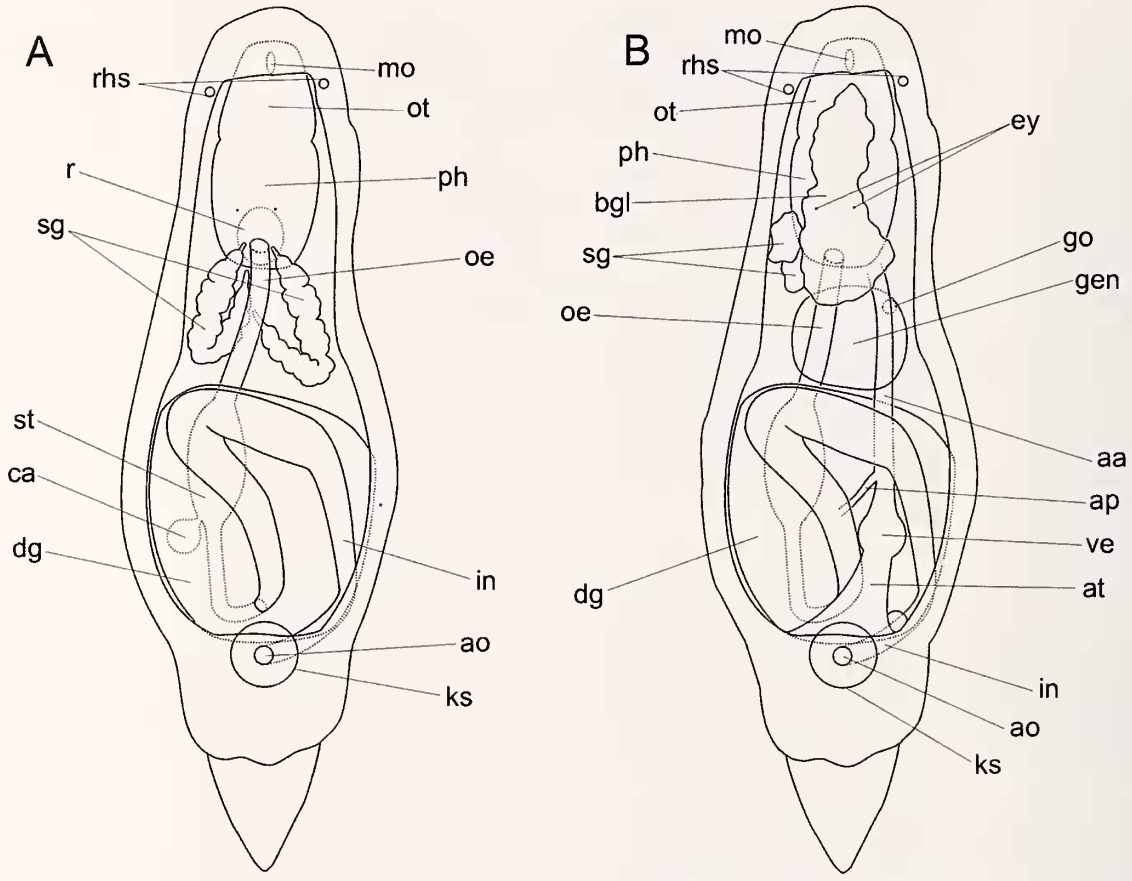

Figure 6. *Hypselodoris picta lajensis,* schematic anatomical drawings. A, digestive system; B, organization of major organ systems. Abbreviations: **aa,** anterior aorta; **ao,** anus opening; **ap,** posterior aorta; **at,** atrium; **bgl,** blood gland; **ca,** digestive caecum; **dg,** digestive gland; **ey,** eyes; **gen,** reproductive organs; **go,** gonopore; **in,** intestine; **mo,** mouth; **oe,** esophagus; **ot,** oral tube; **ph,** pharynx; **r,** radula; **rhs,** rhinophoral sheath; **sg,** salivary gland; **st,** stomach; **ve,** ventricle.

Reproductive system: Gonad covers the digestive gland dorsally. Proximal gonoduct a long thin tube. Distal genital system triaulic (Figure 7). Hermaphroditic ampulla short and swollen. Distal gonoduct short. Oviduct thin, entering female gland mass after a short distance. Prostatic portion very long, with many loops attached to bursa copulatrix, situated above the ampulla. Distal vas deferens initially a thin winding tube, becoming a wider ejaculatory duct; without armature, slightly everted into elongate penial sheath. Male and female atria distally combined into common vestibule. Vagina a relatively wide tube. Large, spherical, thin-walled bursa (Figure 7). Receptaculum seminis club-shaped, size varying from one-half to one-third the diameter of the bursa, with a visible and curved stalk. Thin uterine duct splitting off the vagina distally to the receptacle stalk; uterine duct entering female gland mass close to the oviduct. Female gland mass well developed, consisting of several barely distinguishable winding glandular portions. Nidamental duct showing conspicuous unilateral swelling; nidamental opening located posterior to the joint vestibule. Flat glandular lobe covering half of female gland mass; deferent duct hidden between nidamental opening and the vestibule (Figure 7).

DISCUSSION

***Hypselodoris* species from Brazil:** Three species of *Hypselodoris* were previously known from Brazil (Marcus & Marcus, 1970; Troncoso et al., 1998; Domínguez et al., 2006b): (1) *H. marci* from the northeastern and southeastern coast; (2) *H. sycilla* from a single record on the northeastern coast; and (3) *H. picta lajensis* from the southeastern and southern coast. The taxonomy of these three species remains confusing, because the original descriptions and recent reports lack comprehensive descriptive data. Despite this, these three species can be easily distinguished from *H. juliae* sp. nov., which is characterized mainly by the combination of the following characteristics: a pale notum with many orange or yellow lines and iridescent

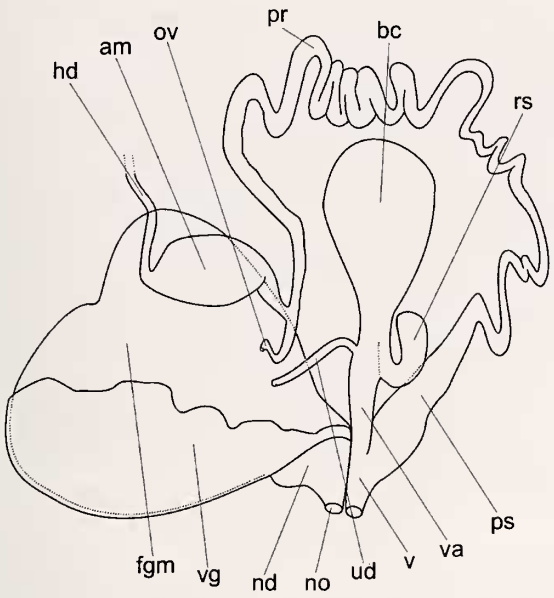

Figure 7. *Hypselodoris picta lajensis,* reproductive system. Abbreviations: **am,** ampulla; **bc,** bursa copulatrix; **ps,** ejaculatory duct; **fgm,** female gland mass; **hd,** hermaphroditic duct; **nd,** nidamental duct; **no,** nidamental duct opening; **ov,** oviduct; **pr,** prostate; **ps,** penial duct; **rs,** seminal receptacle; **ud,** uterine duct; **v,** vestibulum; **va,** vagina; **vg,** vestibular gland.

blue patches, a relatively short prostate, and the absence of denticles on the lateral radular teeth.

Hypselodoris marci is a yellowish species with a reticulate pattern of white, blue, and orange patches, and a grayish submarginal band with dark spots that borders the mantle (Marcus, 1971; Valdés et al., 2006). *Hypselodoris marci* possesses radular teeth with a series of small denticles (Marcus, 1971) and a long coiled prostate (personal observation). This species was originally described from northern Brazil and from Venezuela (Marcus, 1971). Later, it was reported from southeastern Brazil (Domínguez et al., 2006), Belize, and Honduras (Valdés et al., 2006). The assumption that specimens from different localities are conspecific was based mainly on external morphology. This may, however, lead to some taxonomic confusion, as did the supposed record of this species in the Caribbean Sea of Mexico (Ortea et al., 1996). The material originally illustrated by Ortea et al. (1996) corresponds to a different, recently described species, *Hypselodoris olgae* Ortea & Bacallado, 2007.

Hypselodoris sycilla was originally described in 1890, from the Yucatan Peninsula, Caribbean Sea of Mexico, and remains a poorly known species. Valdés et al. (2006) suspected that *H. sycilla* could be synonymous with *H. zebra* from Bermuda. The single record of *H. sycilla* from Brazil refers to a single specimen (Marcus & Marcus, 1970), considered as a representative of *H. picta* by Ortea et al. (1996), but whose identity remains unresolved. Like *H. juliae* sp. nov., *H. sycilla* is characterized by a pattern of longitudinal yellow lines. However, *H. sycilla* has a dark-blue notum (Bergh, 1890). Besides the differences in body color, *H. juliae* sp. nov. also differs from *H. sycilla* in radular morphology, the latter having small denticles on the radular teeth (Bergh, 1890), which are absent in *H. juliae* sp. nov.

Hypselodoris picta lajensis is a dark-blue to violet species with well-spaced dorsal lines. The blue body sides also have yellow lines. Based on the original description and observations of additional material, Domínguez et al. (2006) separated *H. picta lajensis* from *H. picta*. The authors considered that *H. lajensis* has five dorsal yellow lines (against three lines in *H. picta*); uniformly deep blue-violet gills (against gill rachises with yellow lines in *H. picta*), and a deferent duct with a narrow preprostatic portion, which is absent in *H. picta*. However, our study of newly collected material broadened our perspective on morphological variation in *Hypselodoris picta lajensis*. Some specimens have up to nine dorsal yellow lines, rather than only five, and the gills have yellow lines on their rachises. Furthermore, the mantle margin of most of our specimens was completely yellow, not white with anterior and lateral marks, as originally described by Troncoso et al. (1998). Interestingly, this variation was observed between groups of specimens from two adjacent regions. All observed and collected specimens from Ilha Comprida, Cabo Frio (22°53′49″S, 41°59′2″W) have white mantle margins with yellow marks, whereas the majority of specimens observed or collected at Ilha do Papagaio, Cabo Frio (22°51′46″S, 41°56′32″W; 5.7 km distant from Ilha Comprida) have yellow mantle margins.

Differences between our material and that described by Troncoso et al. (1998) and Domínguez et al. (2006) also include radular features. Teeth were described as possessing upper cusps of approximately double the length of the lower cusps; an additional small denticle may be present on the lower cusp (Troncoso et al., 1998). In contrast, both cusps are nearly equally long in our material, and devoid of denticles on the lower cusp. Another difference was noted in the shape of the outermost lateral teeth. In our material, these teeth are a single plate without two major cusps, whereas bicuspid teeth were described for the type material (Troncoso et al., 1998). Sizes and proportions of allosperm receptacles also vary considerably in our material, but such variations probably reflect different stages of maturity and sexual activity. However, a differentiated, long, thin preprostatic portion, as illustrated originally (Troncoso et al., 1998, fig. 5), was not observed in the specimens that we examined. Furthermore, the postprostatic portion of our material is shorter and less convoluted. Because of these

variations, we prefer to maintain the subspecies rank of *H. picta lajensis* until a comprehensive revision of all material of *H. picta*, including detailed anatomical comparisons and also a molecular approach, can provide a better understanding of this group.

Hypselodoris juliae sp. nov. clearly differs from *H. picta lajensis* in patterns of coloration; the former has a much clearer background color, and more and thinner longitudinal lines on the notum. The gill of *H. juliae* sp. nov. has dark rachises with orange margins, whereas *H. picta lajensis* has a dark-blue gill, with dark-blue rachises with or without yellowish margins. A white posterior mark is present on the rhinophores of *H. juliae* sp. nov. but absent in *H. picta lajensis*. Furthermore, the lateral teeth of *H. juliae* sp. nov. lack any denticles, whereas 1–7 denticles are present in *H. lajensis*. The prostate of *H. picta lajensis* is much more elongated and convoluted than the prostate of *H. juliae* sp. nov.

Caribbean species similar to *Hypselodoris juliae* sp. nov.: Other species of *Hypselodoris* from the tropical western Atlantic resemble *H. juliae* sp. nov. with regard to background coloration and in having longitudinal yellow or orange stripes, i.e., *H. ruthae*, *H. espinosai*, and *H. bayeri*. Reaching up to approximately 30 and 20 mm in length, respectively, the former two species are considerably smaller than *H. juliae* sp. nov., have no more than half the number of notal stripes, and their free notal margins are not undulating as in *H. juliae* sp. nov. Furthermore, the lateral radular teeth of *H. ruthae* and *H. espinosai* have small denticles, which are absent in *H. juliae* sp. nov. (see Ortea et al., 1996).

Hypselodoris bayeri is known from Florida, Cuba, Panama, Mexico, and Belize (Valdés et al., 2006). This species is blue with relatively broad yellow lines along the notum, body sides, and tail, which may be connected in a netlike pattern. The corresponding lines are more than twice as numerous and much narrower in *H. juliae* sp. nov. Submarginal rows of black dots along the notum and the foot are present in *H. bayeri* but absent in *H. juliae* sp. nov. The upper cusps of the lateral teeth are up to five times longer than the lower ones, and denticles are present in *H. bayeri* (see Ortea et al., 1996: fig. 65), whereas the cusps are equal in size or only slightly longer in *H. juliae* sp. nov. Caribbean specimens illustrated and listed as *Hypselodoris* sp. 3 by Valdés et al. (2006) externally resemble *H. bayeri* and, thus, differ from *H. juliae* sp. nov. in all the points mentioned above concerning external features.

Hypselodoris juliae sp. nov. clearly differs from the nominal western Atlantic and other known species of *Hypselodoris*, and is thus established as a new species herein. Future studies of specimens of *Hypselodoris* sp. 1 of Valdés et al. (2006) and *Hypselodoris* sp. 4 of Rudman (2001–2003) will show whether or not they are conspecific with *H. juliae* sp. nov.

Acknowledgements. We acknowledge Mark DaCosta (Bregenz) for providing diving equipment and for help during field work. Dr. Peter Wirtz (Madeira Island) kindly sent us photographs of the specimen from Guarapari. Dr. Roland Melzer and Enrico Schwabe instructed us in preparing SEM micrographs, and Prof. Gerhard Haszprunar (all at ZSM) provided laboratory facilities and helpful advice. We also thank the CaboFrioSub staff, especially Carlos Alberto Filho, for the dive operations in Cabo Frio; Noêmia Rodrigues, from the Laboratório de Ultraestrutura Celular da Universidade Federal do Rio de Janeiro, for assistance with the SEM; Dr. Janet Reid and Dr. Juan Maceira for revising the English text. This study was supported by the GeoBioCenter^{LMU}, the German Research Foundation (DFG; SCHR 667-3) to MS, and the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq-Brasil) to VP.

LITERATURE CITED

BERGH, L. S. R. 1890. Report on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico (1877–1878), and in the Caribbean Sea (1879–1880), by the U.S. Coast Survey steamer "Blake," Lieut.-Commander C. D. Sigsbee, U.S.N., and Commander J. R. Bartlett, U.S.N., commanding. Report on the nudibranchs. Bulletin of the Museum of Comparative Zoology 19:155–181.

DACOSTA, S., C. M. CUNHA, L. R. L. SIMONE & M. SCHRÖDL. 2007. Computerbased 3-dimensional reconstruction of major organ systems of a new aeolid nudibranch subspecies, *Flabellina engeli lucianae*, from Brazil (Gastropoda, Opisthobranchia). Journal of Molluscan Studies 73:339–353.

DOMÍNGUEZ, M., F. J. GARCÍA & J. TRONCOSO. 2006a. Some aspects of the family Chromodorididae (Opisthobranchia: Nudibranchia) from Brazil, with description of a new species. Scientia Marina 70(4):621–634.

DOMÍNGUEZ, M., F. J. GARCÍA & J. TRONCOSO. 2006b. A new species of *Hoplodoris* Bergh, 1880 (Gastropoda: Opisthobranchia: Nudibranchia) from the Atlantic Ocean. The Nautilus 120(4):150–155.

GARCÍA, F. J., J. S. TRONCOSO & M. DOMINGUEZ. 2002. New data on the benthic molluscs from the Archipelago of Fernando de Noronha (Brazil), with description of a new species of *Aegires* Lovén, 1844. Iberus 20:45–56.

GARCÍA, F. J. & J. S. TRONCOSO. 2003. Two unknown species of Mollusca Gastropoda from the Archipelago Fernando de Noronha (Brazil), with description of a new species belonging to the genus *Phidiana* Gray, 1850 and a new record of *Dendrodoris senegalensis* Bouchet, 1975. Scientia Marina 67:159–166.

GARCÍA, F. J. & J. S. TRONCOSO. 2004. A new species of *Anetarca* Gosliner, 1991 (Gastropoda: Opisthobranchia: Facelinidae) from Western Atlantic Ocean. The Nautilus 118:139–143.

MARCUS, ER. & EV. MARCUS. 1970. Opisthobranchs from Curaçao and faunistically related regions. Studies on the Fauna of Curaçao and other Caribbean Islands 122:1–129.

MARCUS, EV. 1970. Opisthobranchs from northern Brazil. Bulletin of Marine Science 20:922–951.

MARCUS, EV. 1977. An annotaded checklist of the western

atlantic warm water Opisthobranchs. Journal of Molluscan Studies Suppl. 4:1–23.

Ortea, J. & J. J. Bacallado. 2007. Descripción de una nueva especie de *Hypselodoris* Stimpson, 1855 (Mollusca: Nudibranchia: Chromodorididae) nombrada en homenage a Olga Ucelay Sabina. Revista de la Academia Canaria de Ciencias 18(4):53–60.

Ortea, J., A. Valdés & J. C. García-Gomez. 1996. Revisión de las especies atlánticas de la familia Chromodorididae (Mollusca: Nudibranchia) del grupo cromático azul. Avicennia, suplemento 1:1–165.

Padula, V. & R. S. Absalão. 2005. Primeiro registro de *Babakina festiva* (Roller, 1972) (Mollusca: Nudibranchia) no Atlântico Sul. Biociências 13:99–101.

Padula, V. & F. N. Santos. 2006. Three new records of Nudibranchia (Mollusca, Gastropoda)—additions on the Brazilian biodiversity. Biociências 14(2):214–220.

Pola, M., J. L. Cervera & T. M. Gosliner. 2005. A new species of *Tambja* (Nudibranchia: Polyceridae: Nembrothinae) from southern Brazil. Journal of the Marine Biological Association of the U.K. 85:979–984.

Rios, E. C. 1994. *Seashells of Brazil*. Fundação Universidade do Rio Grande, Centro de Ciencias do Mar, Museu Oceanográfico, 331 pp.

Rudman, W. B. 2001–2003. *Hypselodoris* sp. 4. Available at: http://www.seaslugforum.net/factsheet.cfm?base=hypssp4 (accessed in 10 January 2006).

Troncoso, J. S., F. J. García & V. Urgorri. 1998. Anatomical data on rare *Hypselodoris picta* (Schultz, 1836) (Gastropoda: Doridacea) from the coast of Brazil, with description of a new subspecies. Bulletin of Marine Science 63:133–141.

Valdés, Á., J. Hamann, D. W. Behrens & A. DuPont. 2006. Caribbean Sea Slugs: A Field Guide to the Opisthobranch Mollusks from the Tropical Northwestern Atlantic. Sea Challengers: Gig Harbor, Washington. 289 pp.

Wilson, N. G. & R. C. Willan. 2007. *Hypselodoris jacksoni*, a new species from the southwestern Pacific Ocean (Nudibranchia: Chromodorididae), with a discussion on intraspecific variation in mantle glands in *Chromodoris willani* Rudman, 1982. Zootaxa 1549:29–42.